

# A Generalized Formula for the Mantel-Haenszel Differential Item Functioning Parameter

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## Abstract

The present study derives a general formula for the population parameter being estimated by the Mantel-Haenszel (MH) differential item functioning (DIF) statistic. Because the formula is general, it is appropriate for either uniform DIF (defined as a difference in item response theory item difficulty values) or nonuniform DIF; and it can be used regardless of the form of the item response function. In the case of uniform DIF modeled with two-parameter-logistic response functions, the parameter is well known to be linearly related to the difference in item difficulty between the focal and reference groups. Even though this relationship is known to not strictly hold true in the case of three-parameter-logistic (3PL) uniform DIF the degree of the departure from this relationship has not been known and has been generally believed to be small. By evaluating the MH DIF parameter, we show that for items of medium or high difficulty, the parameter is much smaller in absolute value than expected based on the difference in item difficulty between the two groups. These results shed new light on results from previous simulation studies that showed the MH DIF statistic has a tendency to shrink toward zero with increasing difficulty level when used with 3PL data.